

CADDISFLIES (TRICHOPTERA) OF WILDCAT CREEK, PICKENS COUNTY, SOUTH CAROLINA¹

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ABSTRACT: Sixty-two species of caddisflies (Trichoptera) were identified from collections made from Wildcat Creek over a period of 33 years. A new distributional record for South Carolina was obtained for *Diplectrona metaqui*. Eight species, *Polycentropus carlsoni*, *Wormaldia thyria*, *Neotrichia collata*, *Stactobiella delira*, *Neophylax atlanta*, *Goera fuscula*, *Pseudogoera singularis*, and *Agarodes griseus*, are considered to be threatened in South Carolina. *Psilotreta frontalis* should be removed from the list of threatened species in South Carolina. The diverse caddisfly fauna of Wildcat Creek adds further support to the recommendation by other authors for its use as a biodiversity reference stream.

The aquatic insect fauna of Wildcat Creek has been well documented for mayflies (Ephemeroptera), stoneflies (Plecoptera), and other significant biota (Westfall 1947; McCaskill 1967, unpub. thesis, Clemson Univ., 1973, unpub. dissertation, Clemson Univ.; McCaskill and Prins 1968; Carlson 1971, unpub. thesis, Clemson Univ.; White *et al.* 1979; Stark 1983; Adler 1987; and Daniels and Morse 1992). Because of its potential use as a biodiversity reference stream, as indicated by the high diversity of Ephemeroptera and Plecoptera and the occurrence of several other rare or unique plant and animal species (Daniels and Morse 1992), an additional faunistic study was undertaken to document the caddisfly (Trichoptera) fauna.

Wildcat Creek is a second order tributary of Six Mile Creek in southwestern Pickens County, South Carolina (Fig. 1). It is a clear stream with a gravel and sand substrate and a riparian zone composed of mixed hardwoods. Wildcat Creek lies within the Piedmont Physiographic Region and drains approximately 204 ha (504 ac), 47% (96 ha or 236 ac) of which lies within the Clemson University Experimental Forest (CUEF). The portion of the watershed within the CUEF has been proposed as a Registered Heritage Site as part of the Heritage Trust Program of the South Carolina Wildlife and Marine Resources Department (Fig. 1). This designation would minimize the effects of anthropogenic disturbances such as clearcutting, private development, or sedimentation. A more detailed description of the watershed, including its management

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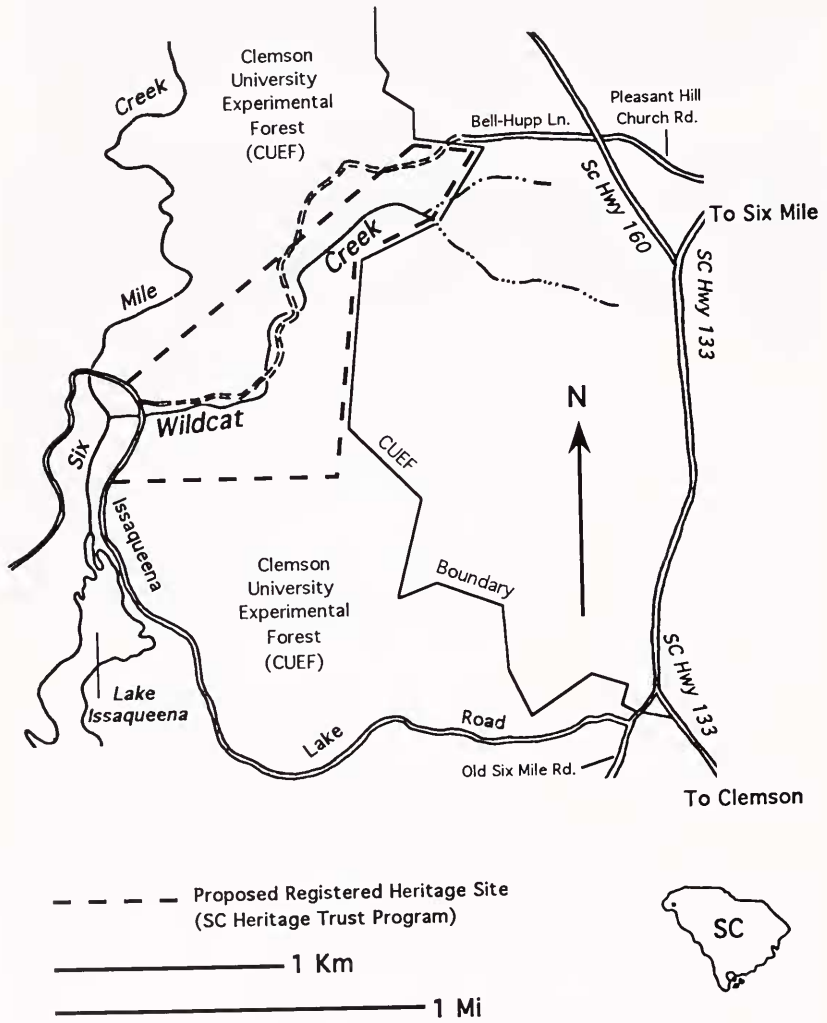


Fig. 1. Map of Wildcat Creek and surrounding area.

by the Clemson University Forestry Department and its biological, educational, and recreational importance, was provided by Sorrells (1984) and Daniels and Morse (1992).

MATERIALS AND METHODS

The 3980 specimens of Trichoptera examined in this study are housed within the Clemson University Arthropod Collection (CUAC). Many of these specimens have been collected since 1956 by students from the Clemson University Aquatic Insects course (ENT 469/669) or Taxonomy of Immature Insects course (ENT 808). Other collections have been made by Carlson (1971, unpub. thesis, Clemson Univ.), Hoffman and Morse (1990), and by the authors. Collections of larvae have been made by qualitative benthic collecting, while adults have been obtained by a variety of methods. Carlson (1971, unpub. thesis, Clemson Univ.) used a modified emergence trap composed of parachute-netting which was stretched across the stream, touching either the water or ground on all four sides. Malaise traps and ultraviolet light traps were used by Hoffman and Morse (1990) and the authors. The authors performed or verified all identifications.

RESULTS AND DISCUSSION

Sixty-two species of caddisflies, representing 17 families, were identified from collections obtained from Wildcat Creek (Table 1, Page 176). A new distributional record for South Carolina was obtained for *Diplec-trona metaqui* Ross. Eight species of Wildcat Creek Trichoptera, *Polycentropus carlsoni* Morse, *Wormaldia thria* Denning, *Neotrichia collata* Morton, *Stactobiella delira* (Ross), *Goera fuscula* Banks, *Pseudogoera singularis* Carpenter, *Psilotreta frontalis* Banks, and *Agarodes griseus* Banks, were designated as threatened by the Invertebrate Taxa Review Committee of the South Carolina Heritage Trust Program (Morse *et al.* 1979, and unpublished data). Unless otherwise noted, distributional and habitat information listed below were taken from Morse *et al.* (1979).

Polycentropus carlsoni is known from only two states, Alabama and South Carolina. In Alabama it has been reported from two locations in Calhoun County (Harris *et al.* 1991). South Carolina records include two locations in the CUEF (Wildcat Creek, the type locality for this species, and Indian Creek, a first order tributary of Six Mile Creek, Lake Issaqueena [Adler 1992, unpub. dissertation, Clemson Univ.]) and a springbrook 10 km south of Clemson in Pendleton, Anderson County (Hoffman and Morse 1990). Each of these collections is from first order, clear,

cold streams (Hoffman and Morse 1990). The United States Department of Interior (1984) listed *P. carlsoni* as Category 2 (possibly endangered or threatened, but lacking conclusive data). With the exception of two males captured by ultraviolet light traps in Alabama, this species has been captured solely with the use of modified emergence traps or Malaise traps (Hoffman and Morse 1990).

Wormaldia thyria has been found at no other locality in South Carolina except Wildcat Creek. It has been reported from four other states, Alabama (Frazer *et al.* 1991), North Carolina (Denning 1950), Tennessee (Etnier and Schuster 1979), and Virginia (Parker and Voshell 1981). It is found in small, clear, cold streams in the Mountains and Upper Piedmont.

Neotrichia collata is known from only one other locality in South Carolina, a tributary of Brasstown Creek in Oconee County. It is reported to inhabit small, cold, rocky, rapidly flowing streams and has been found in seven other states: Alabama (Harris *et al.* 1983), Illinois and Kentucky (Ross 1944), Maine (Blickle 1979), New York (Morton 1905), Utah (Baumann and Unzicker 1981), and Vermont (Harris *et al.* 1991).

Stactobiella delira has been reported from 26 states and one Canadian Province (a distribution including British Columbia and California extending east to Maine and South Carolina). However, it is known from only two localities in South Carolina, Wildcat Creek and South Fork of the Saluda River, both of which are clear, cold, rocky streams.

Goera fuscula is known from only two other South Carolina streams, the Chattooga River and a tributary of Brasstown Creek (both in Oconee County). It requires cold, rocky, upland streams and has been reported from Georgia (Schmid 1983), Massachusetts, New York, Tennessee, and Virginia (Flint 1960), Maine (Mingo and Gibbs 1980), North Carolina (Banks 1905), and Quebec (Roy and Harper 1979).

Pseudogoera singularis has been reported in South Carolina from only two other streams, Toxaway Creek and Yellow Branch, both of which lie in Oconee County. The larvae and pupae inhabit moss-covered waterfalls in small, clear, relatively unpolluted streams at elevations of 245 to 825 m (800 to 2700 ft.) (Wallace and Ross 1971). It has been reported from Georgia (Wallace and Ross 1971), North Carolina (Carpenter 1933), and Tennessee (Etnier and Schuster 1979).

Psilotreta frontalis should no longer be considered threatened in South Carolina because its distribution in the state now has increased to six counties: Aiken, Greenwood, Lexington, Oconee, Pickens, and Saluda (Floyd, unpub. data). It has been reported from 18 other states in the eastern United States (Parker and Wiggins 1987).

Argores griseus has been reported from 20 states in the eastern United States (Harris *et al.* 1983, Harris *et al.* 1991, Parker and Wiggins 1987, Schmid 1983). It is found in depositional areas of small spring seepages and spring streams in three localities in the upper Piedmont of South Carolina. These include Wildcat Creek, Indian Creek (Adler 1992, unpub. dissertation, Clemson Univ.), and a springbrook in Pendleton, Anderson County.

Although not designated by Morse *et al.* (1979) as threatened in South Carolina, one additional species, *Neophylax atlanta* Ross, undoubtedly deserves such a designation. It has been reported from four states, Alabama, Georgia, Virginia, and South Carolina (Ross 1947, Harris *et al.* 1991) but has been found at only two sites, Indian Creek (Adler 1992, unpub. dissertation, Clemson Univ.) and Wildcat Creek, in South Carolina.

Wildcat Creek also is a paratype locality for the subspecies *Cheumatopsyche harwoodi enigma* Ross, Morse, and Gordon (1971). In South Carolina it is known additionally from South Saluda River and Eastatoe Creek in Pickens County, as well as Thompson River, Coley Creek, and Bearcamp Creek in the mountains of Oconee County (Morse *et al.* 1989). Outside South Carolina it has been reported from cold, rocky Piedmont and Mountain streams in Arkansas (Bowles and Mathis 1989), Georgia (Ross, Morse, and Gordon 1971), North Carolina (Gordon 1974), and Virginia (Parker and Voshell).

Because of the high diversity of such orders as mayflies and stoneflies, as well as the presence of other rare and unique aquatic insects, Daniels and Morse (1992) suggested that Wildcat Creek be used as a biodiversity reference stream. The diverse caddisfly fauna detailed in this study serves to reinforce this recommendation. Furthermore, the entire watershed should be protected and managed to maintain its high diversity of plants and animals and thus preserve its potential use for education, recreation, and research.

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Table 1. Caddisflies (Trichoptera) of Wildcat Creek, Pickens County, South Carolina.

Classification follows that of Weaver and Morse (1986). Stages of development (larva, pupa, and adult) by which species are represented are indicated by L, P, and A, respectively. Stages of development are followed by number of specimens in that particular stage. Dates refer to capture times of adult specimens. New distributional records for South Carolina are indicated by the symbol (#). Threatened species as listed by the invertebrate Taxa Review Committee of the South Carolina Heritage Trust Program (Morse *et al.* 1979) are indicated by an asterisk (*). An additional species not listed as threatened by Morse *et al.* (1979), but deserving such designation, is indicated by a plus symbol (+).

Suborder Annulipalpia

Infraorder Curvopalpia

Superfamily Hydropsychoidea

Family Hydropsychidae

Ceratopsyche sparna (Ross), L (4), A (14 F, 6 M), 10 Apr.-29 June.

Cheumatopsyche harwoodi enigma Ross, Morse, & Gordon, A (87 F, 48 M), 8 Apr.-26 Sep.

Cheumatopsyche pettiti (Banks), A (17 F, 6 M), 18 Apr.-22 Aug.

Cheumatopsyche pinaca Ross, A (39 F, 9 M), 13 Apr.-22 Aug.

#*Diptertrichia metaqui* Ross, L (1).

Diptertrichia modesta Banks, L (25), A (22 F, 15 M), 4 Apr.-8 Sep.

Hydropsyche betteni Ross, A (17 F, 4 M), 17 Apr.-30 Jul

Parapsyche cardis Ross, L (14), A (2), 21 May.

Potamyia flava (Hagen), L (2).

Family Polycentropodidae

Cynellus marginalis (Banks), A (5 F), 19-21 Jun.

Nyctiophylax nephophilus Flint, A (2 M), 21 May.

Phylocentropus lucidus (Hagen), A (1 F), 22 Aug.

Phylocentropus placidus (Banks), A (1 F), 21 May.

Polycentropus blicklei Ross & Yammamoto, A (14 F, 27 M), 14 Apr.-25 Sep.

* *Polycentropus carlsoni* Morse, A (5 F, 3 M), 15 Apr.-4 Jul.

Polycentropus cinereus Hagen, A (22 F, 26 M), 22 Apr.-4 Sep.

Polycentropus confusus Hagen, A (3 M), 20 Apr.

Polycentropus maculatus Banks, A (3 F), 15 Apr.-12 May.

Family Psychomyiidae

Lype diversa (Banks), A (212 F, 1220 M), 10 Apr.-14 Oct.

Psychomyia flavida Hagen, A (460 F), 20 Apr.-4 Sep.

Superfamily Philopotamoidea

Family Philopotamidae

Chimarra aterrima (Hagen), A (13 F, 10 M), 4 Apr.-20 Jun., 6-13 Oct.

Chimarra obscura (Walker), A (1 F), 21 May.

Dolophilodes distinctus (Walker), L (9), P (4), A (64 F, 68 M), 10 May-8 Nov.

Dolophilodes major (Banks), A (1 F), 21 May.

Wormaldia moesta (Banks), A (11 F, 18 M), 20 Apr.-7 Oct.

* *Wormaldia thyria* Denning, A (1 M), 22 Jul.

Infraorder Spicipalpia

Superfamily Hydroptiloidea

Family Glossosomatidae

Agapetus iridis Ross, A (328 F, 144 M), 20 Apr.-13 Aug.

Glossosoma nigrior Banks, L (1), A (51 F, 25 M), 19 Mar.-23 Sep.

Family Hydroptilidae

Hydroptila amoena Ross, A (17 M), 19 Apr.-18 Sep.

Hydroptila gunda Milne, A (27 M), 10 Apr.-21 May.

Hydroptila quinola Ross, A (6 M), 19 Apr.-27 Jun.

* *Neotrichia collata* Morton, A (2 M), 12-20 Jun.

* *Stactobiella delira* (Ross), A (2 F, 1 M), 10-20 Apr.

Superfamily Rhyacophiloidea

Family Rhyacophilidae

Rhyacophila carolina Banks, L (4), P (1), A (74 M), 10 Apr.-19 Sep.

Rhyacophila fuscula (Walker), L (5), A (2 F, 5 M), 18 May-21 May, 31 Aug.-18 Sep.

Rhyacophila glaberrima Ulmer, L (1), A (35 F, 59 M), 24 Apr.-4 May, 21 Aug.-26 Oct.

Rhyacophila minor Banks, P (1), A (1 M), 15-22 May.

Rhyacophila nigrita Banks, A (21 M), 23 Apr.-26 May, 6 Oct.

Rhyacophila teddyi Ross, A (1 M), 22 May.

Rhyacophila torva Hagen, L (6), A (25 M), 4 Apr.-24 Sep.

Suborder Integripalpia

Infraorder Plenitentoria

Superfamily Limnephiloidea

Family Limnephilidae

* *Goera fuscula* Banks, L (3), A (6 F, 3M), 20 Apr.-27 Jun.

Pycnopsyche antica (Walker), L (15), A (5 F, 4 M), 4 Sep.-8 Nov.

Pycnopsyche gentilis (MacLachlan), L (45), P (8), A (13 F, 13 M), 12 Sep.-14 Oct.

Pycnopsyche guttifer (Walker), L (7).

Pycnopsyche luculenta (Betten), L (23), A (8 F, 4 M), 26 Sep.-8 Nov.

Family Uenoidea

+*Neophylax atlanta* Ross, A (2 M), 11-14 Oct.

Neophylax mitchelli Carpenter, L (4), A (6 M), 11-14 Oct.

Neophylax oligius Ross, A (13 M), 1-14 Oct.

Family Brachycentridae

Brachycentrus nigrosoma (Banks), L (1).

Mierasema sp., A (1 F), 8-15 May

Family Lepidostomatidae

Lepidostoma latipenne (Banks), A (83 F, 61 M), 15 Apr.-8 Nov.

Lepidostoma ontario Ross, A (1 F, 1 M), 20 Apr., 17 Jun.

Infraorder Brevitentoria

Superfamily Leptoceroidea

Family Odontoceridae

* *Pseudogoera singularis* Carpenter, P (2), A (2 F, 2 M), 31 Aug.-18 Sep.

* *Psilotreta frontalis* Banks, L (17), A (57 F, 93 M), 19 Apr.-21 Jun., 8-15 Aug.

Family Calamoceratidae

Anisocentropus pyraloides (Walker), L (8), P (1), A (12 F, 31 M), 17 May-8 Aug.

Heteroplectron americanum (Walker), L (1), A (5 F), 20 Apr.-22 May.

Family Leptoceridae

Ceraclia protonepha Morse & Ross, A (3 F, 3 M), 20 Apr. 21 May.

Oecetis inconspicua (Walker), A (10 F, 4 M), 20 Apr.-27 Jun, 22 Aug.-18 Sep.

Trianodes ignitus (Walker), A (4 F, 7 M), 19 Apr.-22 Aug.

Family Molannidae

Molanna blenda Sibley, A (11 F, 10 M), 19 Apr.-24 May, 22 Jun.-23 Sep.

Superfamily Sericostomatoidea

Family Helicopsychidae

Helicopsyche paralimnella, L (2).

Family Sericostomatidae

* *Agarodes griseus* Banks, A (2 F, 4 M), 5-24 May.

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